Parabolic Trough Workshop
Madison, WI June 18, 2000

Ken May
Industrial Solar Technology

- Analysis of SEECOT (Solar Energy Enhanced Combustion Turbine)
- Development of Lower Cost, Higher Performance Concentrator

SEECOT

- CT Inlet Air Cooling

  Operate two stage Absorption Chiller

  Steam 150 psig, 350 F
- CT Steam Injection

  450 psig, 460 F

Inlet Air Cooling

Preliminary Results

- Assumptions
  - 100% CC Capacity Factor
  - No Solar Storage
- 13% Peak Power Enhancement
- 4% Increase in June Electricity Delivery
- 2% Increase in Annual Delivery
- Installed cost <$600/kW

STIG

Preliminary Results

- 11% Peak Power Enhancement
- 3.3% Increase in June
- 1.7% Increase in Annual Delivery
- Reduced Heat Rate
- Installed Cost <$1000/kW

SEECOT Markets

- Arizona Environmental Portfolio Standards

  10 – 20 MW Increments
- Green Power
- Clean Power (reduced emissions)

Development of Lower Cost, Higher Performance Concentrator

- Use IST Structural Concept

  Reflector integral to structure
- Change from Aluminum to Steel
- Change from Aluminized Film to thin Silvered Glass
- Increase Production

Concentrator Material

Aluminum

- Lightweight concentrator,
  5.4 kg/m2
- Corrosion resistant
- Easy to work
- Smooth surface for reflective films
- Advantages for low production rates

Steel

- 17 kg/m2
- Low cost material
- Stronger
- More rigid
- Easier, stronger welds
- Compatible with glass
- Reduced shading
- Longer Rows

Reflector Material

Aluminized Film

- Low cost
- Easy to apply
- Unbreakable

Silvered Glass

- High reflectance
- Long life
- Compatible with steel substrate
- Scratch resistant

Cost and Performance Goals

- Reduce concentrator cost by 30-40%
- Installed solar system cost of $100-120/m2
- Increase annual energy delivery by 15%

Additional R&D Needs

- High temperature selective absorber coating
- Silver reflective film
- Small efficient engines, 300 – 5000 kW
- Reduced cost thermal storage to 600 F
- DSG at reduced pressures, 5 – 40 bar